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## ABSTRACT

A project was undertaken at two state universities to investigate the physical dimensions of college classroom environments and their effects on student attitudes and the determining factors of such attitudes. The attitudes of 789 undergraduate, introductory psychology students toward 11 college classrooms were surveyed through administration of questionnaires. An open-ended question asked students to state their impressions of the physical classroom environment and to rate their attitudes toward that physical classroom on an eleven-point rating scale. Six other eleven-point rating scales were aimed at the potential influence of attitudes toward instructor, subject matter, class social atmosphere, class time, class duration, and schedule fit. A classroom modification project, employing continuous behavioral and attitudinal assessment, also was undertaken. Environmental dimensions in need of improvement and available for manipulation were esthetics, furniture, use of space, the use of color, decorations, fabric, and carpeting. After modifications to the physical dimensions of the classroom, surveys were administered. The rating scale is enclosed. (SW)

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## PHYSICAL DIMENSIONS OF COLLEGE CLASSROOM ENVIRONMENTS

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This project investigates the physical dimensions of college classroom environments, their effects on student attitudes and the determining factors of such attitudes. Surveys of some 860 undergraduate students were conducted at two universities and a classroom modification project was undertaken.

### Student Attitudes

The attitudes of 789 undergraduate students toward 11 college classrooms at two state universities on the East and West coast were surveyed via questionnaires. Students from 23 introductory psychology courses were assessed. The study was limited to students from introductory psychology courses in order to control for potential influence of course subject matter on student attitudes toward classroom environments, as well as to achieve a balanced representation of academic majors. This sample contained 45% females, 55% males; 90% were under 25 years of age. Anonymous questionnaires were administered to the respondents at the beginning of class in the classrooms under investigation. An open-ended question asked students to state their impressions of the physical classroom environment and then rate their attitude toward that physical classroom on an eleven-point rating scale, ranging from "Strongly dislike" (0) via "Neutral" (5) to "Strongly like" (10). Six other eleven-point rating scales were aimed at the potential influence of attitudes toward instructor, subject matter, class social atmosphere, class time, class duration and schedule fit (Appendix). Categorizing open-ended responses yielded the following physical dimensions of classroom environments: esthetics, space/shape, heating/ventilation/air conditioning, furniture, windows and lighting.

While the scaled attitudes toward classrooms generally fell between neutral and slightly negative, the open-ended responses to physical classroom dimensions--

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with the exception of 'lighting'--showed a pronounced negative trend. Almost half (43%) of all student responses dealt with the esthetics of the classrooms. Of these esthetic responses, 83% were negative, describing classrooms as "spartan", "drab", "boring", "colorless", "sterile", "ugly", "dirty" and "institutional". The actual classrooms were marked by tiled floors, acoustic tiled ceilings, standard furniture and by "neutral" wall colors (e.g. beige, off-grey, off-green, etc.) traditionally selected by architects. Behavioral scientists (Appley et al., 1969, Simmons et al., 1971, Farrenkopf, 1974) concerned with the design of academic buildings have repeatedly called for wider use of accent wall colors and cost-competitive carpeting for sound control and psychological effects. Twenty percent of student comments responded to spatial aspects of the traditionally rectangular classrooms. Eighty percent of these were negative, using terms like "cramped", "enclosed", "confined", "boxed-in" and "crowded". There was no statistical difference between responses toward large classrooms (1500-1600 sq.ft.) as compared to regular sized classrooms (600-700 sq.ft.). The dimension of heating/ventilation/air conditioning--in designers' terms known as "HVAC"--elicited 11% of student comments. Of these, 83% were negative, highlighting "stuffy" air and cold temperatures. Inadequacies and failures of HVAC systems seem to be a common experience in post-design evaluation studies of academic and public buildings (Appley et al., 1969, Simmons et al., 1971, Langdon, 1966, Farrenkopf, 1974). Furniture, consisting of the typical chairs with fixed desk tops, was addressed by 10% of student responses, with 95% of these being negative. Most student complaints dealt with discomfort of the chairs, small size of the desk tops and restrictive furniture arrangements. The dimension of windows accounted for another 10% of student responses, with 84% of these being negative. It is interesting to note that both the absence as well as the presence of windows elicited negative and positive comments. There was no statistical difference in responses toward classrooms with or without windows. Students complained about the lack of windows in window-less classrooms. Farrenkopf showed in a study of an academic department (1974) and in a second study of faculty offices (under review) that the presence of windows is an important factor in the satisfaction of building users. However, some students in the present studies praised the absence of windows for reasons of minimal distraction. In classrooms with windows, on the other hand, the ratio of complaints versus praise fared no better; while some students appreciated the presence of windows, most students complained that

windows were dirty or could not be opened. Both Appley et al. (1969) as well as Simmons et al. (1971) note that building users do not appreciate sealed windows and prefer individualized fingertip control of their ambient environments. The variable of lighting accounted for 6% of student comments, distributed both negatively and positively. Fifty-four percent were negative, citing the artificial nature of the light or that lighting was either poor or too bright, while 46% of the comments expressed satisfaction with the lighting. In other building environment studies (Farrenkopf, 1974, under review) the dimension of lighting has been found to elicit general satisfaction and the least amount of complaints from building users.

Thus, we emerge with a rather dismal picture; five out of six environmental dimensions cited spontaneously by undergraduate users of college classroom environments were regarded with pronounced negativity. With the exception of lighting, which elicited less negative attitudes, 80-95% of student attitudes toward the other dimensions were negative. Farrenkopf (1977) documented two other dimensions of building environments: (a) location or access to people and resources, and (b) privacy/quiet. In the present studies no student comments addressed themselves to these latter variables. A case could be made that students did not apply the factor of privacy to the semi-public classroom environment and did not consider the factor of location when the classrooms under study were within the daily traffic flow of students through the main campus buildings. In addition, respondents may be more "stimulus-bound" with open-ended questions and respond more to visible aspects of the immediate situation and not consider more abstract environmental dimensions. The latter hypothesis receives support from our present study of faculty offices (Farrenkopf, under review).

In order to test the possible influence of other intervening variables on student attitudes toward classroom environments, association and regression analyses were conducted on the scaled student attitudes toward physical classroom, instructor, subject matter, class social atmosphere, class time, class duration and schedule fit. The Pearson correlation and gamma test of ordinal association between attitudes toward physical classrooms and attitudes toward these independent variables yielded low values between .06 and .22 (Table 1). Multiple regression analyses (Table 2) produced significant relationships ( $p < .01$ ) between attitudes toward classroom and toward instructor, as well as

TABLE I. GAMMA ASSOCIATION AND PEARSON CORRELATION MEASURES BETWEEN ATTITUDES TOWARD PHYSICAL CLASSROOM AND ATTITUDES TOWARD EACH INDEPENDENT VARIABLE.

|                        | <u>Gamma</u> | <u>Pearson</u> |
|------------------------|--------------|----------------|
| Physical by Instructor | .20          | .22            |
| Class Subject          | .06          | .09            |
| Social Atmosphere      | .20          | .21            |
| Class Time             | .08          | .12            |
| Class Duration         | .11          | .14            |
| Schedule Fit           | .10          | .11            |

TABLE II. MULTIPLE REGRESSION SUMMARY TABLE. DEPENDENT VARIABLE: ATTITUDE TOWARD PHYSICAL CLASSROOM.

| <u>Independent Variable</u> | <u>Multiple</u> |                      | <u>F</u> | <u>Signif. Level</u> |
|-----------------------------|-----------------|----------------------|----------|----------------------|
|                             | <u>R</u>        | <u>R<sup>2</sup></u> |          |                      |
| Instructor                  | .2246           | .0505                | 7.765    | .01                  |
| Social Atmosphere           | .2710           | .0735                | 7.510    | .01                  |
| Schedule Fit                | .2780           | .0773                | .538     | -                    |
| Class Duration              | .2801           | .0784                | .443     | -                    |
| Class Subject               | .2801           | .0785                | .013     | -                    |

Notes. R = Cumulative correlation between predicted and actual value of the dependent variable.

R<sup>2</sup> = Cumulative percent of variance of the dependent variable accounted for by the independent variable(s).

between attitudes toward classroom and class social atmosphere. However, the regression values were low, with attitudes toward instructor or class social atmosphere each accounting for less than 5% of the variance in attitudes toward physical classrooms. The combined predictive power of all selected variables over physical classroom attitude falls short of 8% of variance accounted for. The present studies lead us to the conclusion that these variables exerted a small influence and that student attitudes toward classroom environments were mostly attributable to the actual physical parameters discussed in this paper.

#### Classroom Modification Project

A recurring theme in the recent literature of environmental design is the advocacy of user-oriented design (Cralk, 1970, Sommer 1969, 1972, Deasy, 1974, Farrenkopf, 1974). Such design responsive to user needs usually requires user attitude surveys and behavioral observations prior to design or prior to design modification. The following classroom modification project used the above student attitude surveys as data base, employing continuous behavioral and attitudinal assessment.

A classroom under the scheduling control of the author's department was selected for modification. Environmental dimensions in need of improvement and available for manipulation were identified: esthetics, furniture, use of space. Regarding esthetics, the use of color, decorations, fabric and carpeting was considered. Furniture, a dimension allowing for greatest control and input by the user organization, could consist of diverse and comfortable pieces, contributing color and esthetic appeal and allowing flexible use. Spatial variables are manipulable via designating, contouring or in flexible ways dividing the classroom into diverse areas. The dimensions of windows and heating, ventilation, air conditioning, while eliciting pronounced negative user attitudes, were not accessible for manipulation given the interior, window-less classroom and centralized HVAC control. Lighting, on the other hand, although not in great need of modification, could be manipulated via diversity/variability of light sources, intensity and color, as well as providing local lighting control over different areas. An observational survey of other modified classrooms on campus showed the frequent use of nontraditional comfortable

furniture, colored chairs, circular group seating arrangement, various means of enhancing esthetic decor and the partitioning of areas. The latter was tried in a design studio classroom but was found to inhibit social interaction and class unity.

During the first phase of the present modification project the selected classroom was equipped with a seminar table, cushioned arm chairs, wall-to-wall carpet, various donated decorative items (such as a brass coat rack, mirror, coffee table, table lamp) and one wall was painted with an orange accent color (the color selection itself involved numerous student and faculty users of the room). From interviews and observations it was learned that several classes using the room conducted small group activities. To facilitate such functions this 17x27ft room was divided into three activity areas with the help of a counter, bookshelves and decorative hanging divider panels. Small groups reportedly enjoyed the partitioned areas for their increased privacy. Several different arrangements for partitioning the room were explored on a trial-and-error basis.

A post-modification survey of the users was conducted via questionnaire, assessing the usage of the room and attitudes toward it. Fifty-three students were surveyed on a time-sampling basis. It was found that 83% of the room use was for class activities, with 75% of the classes consisting of about 25 students. On the previously described attitude scale the mean attitude toward the room was 6.08, with modal scores of 6 and 7. This constituted a shift of about two scale values in the positive direction from the preceding attitude studies. Half of the respondents (49%) expressed dissatisfaction with the partitions, claiming that they impeded class functions and elicited a sense of crowdedness. A full 89% suggested enlarging the room by removing the partitions. Systematic observations showed, indeed, that some partitioned areas were not utilized and that students usually crowded into the reduced open area. Although the room dividing furniture was movable and allowed for flexibility, classes in need of greater space did not spontaneously alter the arrangement. Clifford (1976) appropriately termed such user inertia in making necessary and easy adjustments in their classrooms "environmental numbness". Such reluctance on the part of users of institutional facilities to manipulate environmental dimensions may be due at least partially to the common encounter with bureaucratic restrictions and vetoes--an experience that the present study was not

without. A further recurring problem in the modification of university building environments seems to be the theft of movable items. During the present project the coffee table, coat rack, table lamp and mirror were stolen. A modified 3rd floor lobby in another university building study (Farrenkopf, 1974) experienced a similar fate with the disappearance of carpet, couch and large potted plants. The use of fixed items in semi-public spaces such as classrooms should be considered.

In response to the post-modification feedback the hanging partitions were removed and bookshelves and counter were placed against the wall, thereby converting the room back into a single open space. A subsequent time-sampled survey of 26 users yielded a mean score of 8.6 and modal scores of 8, 9 and 10 on the attitude scale.

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# Appendix

Please take 5 minutes and assist us in our study of the Physical Classroom environment. Be as frank as you can and elaborate on your comments if you wish. Your comments will be treated with confidentiality, only the researchers will see them.

1. What are your impressions of the Physical Classroom Environment?

2. How would you rate your attitude toward this Physical Classroom?

0 1 2 3 4 5 6 7 8 9 10  
 strongly dislike      neutral      strongly like

3. How would you rate your attitude toward:

- a) this instructor  
 0 1 2 3 4 5 6 7 8 9 10  
 strongly dislike      neutral      strongly like
- b) the class subject  
 0 1 2 3 4 5 6 7 8 9 10  
 strongly dislike      neutral      strongly like
- c) the social atmosphere  
 0 1 2 3 4 5 6 7 8 9 10  
 strongly dislike      neutral      strongly like
- d) the time this class is held  
 0 1 2 3 4 5 6 7 8 9 10  
 strongly dislike      neutral      strongly like
- e) the duration of this class  
 0 1 2 3 4 5 6 7 8 9 10  
 strongly dislike      neutral      strongly like
- f) how well the time and day this class is held fits your needs  
 0 1 2 3 4 5 6 7 8 9 10  
 strongly dislike      neutral      strongly like

4. Age \_\_\_\_\_

5. Male \_\_\_\_\_ Female \_\_\_\_\_

6. School:

Agriculture \_\_\_\_\_  
 Arts \_\_\_\_\_  
 Business \_\_\_\_\_  
 Engineering \_\_\_\_\_  
 Environmental \_\_\_\_\_  
 Design \_\_\_\_\_  
 Science \_\_\_\_\_